

CLAIMS

1. An electronic part mounting method which joins circuit electrodes which are made of metal and are formed over a circuit board and die electrodes which are made of metal and are formed over the electronic parts thus mounting the electronic parts on the circuit board,

wherein a low-melting-point metal layer is preliminarily formed over the circuit electrode and/or the die electrode and, thereafter, the circuit electrode and the die electrode are arranged to face each other, the circuit electrode and/or the die electrode are heated at a temperature which melts at least low-melting-point metal thus diffusing the low-melting-point metal layer into the circuit electrode and the die electrode by solid-liquid diffusion whereby the circuit electrode and the die electrode are joined to each other.

2. An electronic part mounting method according to claim 1, wherein the low-melting-point metal layer contains at least one selected from a group consisting of SnIn, In, Bi, SnBi.

3. An electronic part mounting method according to claim 2, wherein a heating temperature at the time of the joining is a temperature which is 0 to 100°C higher than the melting point of the low-melting-point metal.

4. An electronic part mounting method according to any one of claims 1 to 3, wherein a total thickness of the

low-melting-point metal layer which is formed preliminarily between the circuit electrode and the die electrode to be joined assumes a value which falls within a range from 0.1 to 1  $\mu\text{m}$ .

5. An electronic part mounting method according to any one of claims 1 to 4, wherein material of the circuit electrodes and the die electrodes is one selected from a group consisting of Cu, Ni, Au, Al or alloy thereof.

6. An electronic part mounting method according to any one of claims 1 to 5, wherein the surfaces of circuit electrode and the die electrode are formed of coarse surfaces having the surface roughness Ra of 0.4 to 10  $\mu\text{m}$ , and the coarse surfaces are plastically deformed at the time of joining to enable the joining of the circuit electrode and the die electrode.

7. An electronic part mounting method according to any one of claims 1 to 6, wherein the heating and the pressurizing are performed until the low-melting-point metal layer is completely diffused in the circuit electrode and the die electrode by solid-liquid diffusion.

8. An electronic part mounting method according to any one of claims 1 to 6, wherein the heating and the pressurizing are performed until an intermediate alloy layer is formed between the circuit electrode and the die electrode.

9. An electronic part mounting method according to any one of claims 1 to 8, wherein the low-melting-point metal layer is formed such that at least two kinds of metals which can form

alloy are stacked in two layers or more, and the stacked metal layers are preheated to make the metal layers react with each other to form an alloy layer.

10. An electronic part mounting method according to any one of claims 1 to 8, wherein the low-melting-point metal layer is formed by vapor-depositing alloy which constitutes an evaporation source and, at the time of performing the vapor deposition, an evaporation pressure ratio in reaction steps of respective components of the above-mentioned alloy is controlled thus forming a film having the target alloy composition.

11. An electronic part mounting method according to any one of claims 1 to 8, wherein the low-melting-point metal layer is formed by vapor-depositing alloy which constitutes an evaporation source and, at the time of performing the vapor deposition, a product of an evaporation pressure ratio and an active coefficient ratio in reaction steps of respective components of the alloy is controlled thus forming a film having the target alloy composition.